

**Alaska Department of Fish and Game
Division of Wildlife Conservation
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Population Dynamics of Interior and Southwest Alaska Caribou Herds

**Patrick Valkenburg
Mark A. Keech**

**Research Performance Report
1 July 2001–30 June 2002
Federal Aid in Wildlife Restoration
Grant W-27-5, Study 3.45**

This is a progress report on continuing research. Information may be refined at a later date.

If using information from this report, please credit the author(s) and the Alaska Department of Fish and Game. The reference may include the following: Valkenburg, P., and M.A. Keech. 2002. Population dynamics of Interior and Southwest Alaska caribou herds, 1 July 2001 – 30 June 2002. Alaska Department of Fish and Game. Federal aid in wildlife restoration research performance report, grant W-27-5, project 3.45. Juneau, Alaska.

**FEDERAL AID
ANNUAL RESEARCH PERFORMANCE REPORT**

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 25526
Juneau, AK 99802-5526

PROJECT TITLE: Population dynamics of Interior and Southwest Alaska Caribou Herds

PRINCIPAL INVESTIGATORS: Patrick Valkenburg and Mark A Keech

COOPERATORS: Andy Aderman (FWS, Dillingham), Ron Squibb (FWS, King Salmon), and Jeff Denton (BLM, Anchorage)

FEDERAL AID GRANT PROGRAM: Wildlife Restoration

GRANT AND SEGMENT NR.: W-27-5

PROJECT NR.: 3.45

WORK LOCATION: Interior and Southwestern Alaska, including the ranges of the White Mountains, Ray Mountains, Delta, Mulchatna, Nushagak, Northern Peninsula, Southern Peninsula, and Unimak caribou herds.

STATE: Alaska

PERIOD: 1 July 2001–30 June 2002

I. PROGRESS ON PROJECT OBJECTIVES

Project Objective: Evaluate the influence of weather, density, food limitation, disease, hunting, and predation on the population dynamics of Interior and Southwest Alaska caribou herds.

Progress Since Project Inception: This project is the fifth of a series of 5-year studies of population dynamics of the Delta Caribou Herd (DCH). Since about 1991, the study was expanded to include some work on other Interior Alaskan and Southwest Alaskan caribou herds. Previous work has shown that short-term variation in weather and changes in population density can result in food limitation that reduces natality and increases mortality in caribou. Also, virtually the entire range of body weights in female calves aged 4 and 10 months old can be explained by changes in nutrition. Disease has also been shown to be an important factor in the stabilization and decline of 2 caribou herds in southwestern Alaska. Hunting has not been an important factor in caribou population dynamics in Alaska since the early 1970s, except in the Nelchina Herd where population growth was deliberately slowed by hunting. During the first segment period of Study 3.45, monitoring of weather, population density, disease, predation, and hunting continued in the DCH and in other herds.

II. SUMMARY OF WORK COMPLETED ON JOBS IDENTIFIED IN ANNUAL PLAN THIS PERIOD

JOB 1: Census the Delta Herd annually from 2002 to 2006

We successfully counted the DCH on 10 July 2001 (2965 caribou counted) and on 28 June 2002. Photos from the 2002 count were not counted when this report was written. Operating costs (i.e., aircraft charter and film processing costs) were paid out of management funds. Federal Aid funding from this project was used for salaries of research biologists for fieldwork, counting photos, and analyzing data.

JOB 6: Conduct fall composition counts.

We successfully conducted fall composition counts during the last few days of September 2001 and first 2 weeks of October 2001 in the DCH, Mulchatna, White Mountains, Ray Mountains, Macomb, and Northern and Southern Alaska Peninsula caribou herds. Operating costs were paid out of management funds. Funding from this project was used to pay for salaries of research biologists for fieldwork, travel, field supplies, and data analysis. Results are reported in the caribou survey–inventory management reports.

JOB 9: Determining weight, size, and condition of calves

We darted, weighed, measured and radiocollared 14 female calves in the DCH on 30 September 2001, and 15 females calves in the DCH on 5 April 2002. The 4-month-old calves averaged 57.1 kg, and the 10-month-old calves averaged 59.0 kg. Calves were darted, weighed, and measured in other herds, but these results are reported under other Federal Aid projects or were funded from other sources than Federal Aid. In the DCH, Federal Aid funds were used for helicopter charter, field supplies, salary, and data analysis. During fieldwork on other herds, Federal Aid funds from this project were used for salary of research biologists, travel, and some field supplies.

JOB 8: Determining diet composition of Interior and Southwest caribou herds

We continued to collect winter fecal samples on an opportunistic basis during other late winter fieldwork with the DCH, Ray Mountains, and Mulchatna caribou herds. Samples were sent for analysis, but an ongoing laboratory backlog is causing long delays in obtaining results. Federal Aid funds were used for salary cataloguing samples. Operating expenses were covered by other projects or other jobs within this project.

JOBS 4,5: Determining natality rates and weighing newborns in the DCH

On 21 May 2002 we weighed 22 newborn male and 18 female caribou calves in the DCH. Males averaged 9.09 kg and females averaged 9.12 kg. These were the heaviest newborn calves weighed in the DCH to date. Natality of radiocollared caribou was also monitored in the Mulchatna, Nelchina, and Northern Peninsula caribou herds with funding from other Federal Aid projects or money from other sources. Federal Aid funds from this project were used only in the DCH, and they were used for helicopter charter, fuel for a state fixed-wing aircraft, and salary.

JOBS 2,3: Determine movements, dispersal and mortality in adult female caribou in the DCH caribou.

All planned monthly radiotracking flights were made during the reporting period. Mortality rates are calculated from 1 October to 30 September, so results are preliminary. Approximately 50 radiocollared females were on the air on 1 October 2001, and 6 died between 1 October 2001 and 28 June 2002. We conducted monthly searches for radiocollared DCH caribou. Movements were similar to previous years except that no radiocollared caribou wintered east of the Richardson Highway, and there was more use of Unit 13A than in previous years. Three radiocollared adult females were missing from the DCH during calving in 2002. One was found dead near Chistochina, 1 was found alive with a calf on the calving area of the Nelchina Herd, and 1 was found with a newborn calf near the junction of the Denali Park road and the Teklanika River. This is the first time that DCH cows have been documented to use the calving areas of other caribou herds. Federal Aid funds were used for salaries of research biologists, chartering of aircraft, radiotracking caribou, retrieving collars from dead caribou, and investigating cause of death.

JOBS 7,9: Investigating the presence and role of disease in the Delta, Mulchatna, Nushagak Peninsula, and Northern and Southern Alaska Peninsula herds.

We continued to collect and archive serum samples from all caribou handled in the DCH and other herds, including Nushagak, Northern Peninsula, Wolf Mountain, Galena Mountain, and Ray Mountains herds. We did not collect caribou in any of the southwest Alaska caribou herds during this reporting period. Caribou will be collected from the Mulchatna Herd in October 2002. Results from blood samples are not yet available. Federal Aid funds from this project were used for salary, travel, and sample processing.

JOB 9: Recollaring adult caribou in the DCH.

We successfully recollared 3 adult caribou in the DCH. Five other adults were scheduled to have their collars replaced, but bad weather and logistical considerations caused us to delay these collar changes until fall 2002. Federal Aid funds from this project were used for salaries of research biologists, helicopter charter, and field supplies.

JOB 10: Reviewing literature, preparing annual progress reports, a final report, and manuscripts for publication in refereed literature.

One manuscript was published during this reporting period, and we continued work on 3 manuscripts that were presented at the 9th North American Caribou Workshop in Kuujuaq, Quebec in April 2001. These manuscripts have been accepted for publication in the journal *Rangifer*. In addition, we are writing a monograph for submission to *Wildlife Monographs* based on 24 years of study of the Delta Caribou Herd. Funding from this project was used for salary of research biologists for work on the 4 manuscripts and for writing this report.

III. ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

None.

IV. PUBLICATIONS

We conducted work on the following manuscripts or published articles under studies 3.42 and 3.45. Abstracts are attached in the Appendix.

VALKENBURG P. 2001. Stumbling towards enlightenment: understanding caribou dynamics. *Alces* 37(2): 457–474.

VALKENBURG P, RA SELLERS, RC SQUIBB, JD WOOLINGTON, AND BW DALE. 2002. Population dynamics of caribou herds in southwestern Alaska. *Rangifer* Special Issue (in press).

VALKENBURG P, RW TOBEY, BW DALE, BD SCOTTON, AND JM VER HOEF. Body weight of female calves and natality rate of adults as indicators of summer and winter limitation in two Alaskan caribou herds. *Rangifer* Special Issue (in press).

SELLERS RA, P VALKENBURG, RC SQUIBB, BW DALE, AND RL ZARNKE. 2002. Natality and early calf mortality in the Northern Alaska Peninsula and Southern Alaska Peninsula caribou herds. *Rangifer* Special Issue (in press).

V. RECOMMENDATIONS FOR THIS PROJECT

No recommendation at this time.

VI. APPENDIX

Abstracts of manuscripts worked on or published during the FY02 segment period

Natality and early calf mortality of the Northern Alaska Peninsula and Southern Alaska Peninsula caribou herds

RICHARD A SELLERS, PATRICK VALKENBURG, RONALD C SQUIBB, BRUCE W DALE, AND RANDALL L ZARNKE

Abstract: We studied natality in the Northern Alaska Peninsula (NAP) and Southern Alaska Peninsula (SAP) caribou herds during 1996–1999, and mortality and weights of calves during 1998 and 1999. Natality was lower in the NAP than the SAP primarily because most 3-year-old females did not produce calves in the NAP. Natality rates in older females were similar. In our studies of calf mortality, sample sizes were too low to distinguish among causes and many calves died from unknown causes after June. Patterns of calf mortality in the NAP and SAP differed from those in Interior Alaska primarily because neonatal (i.e., during the first 2 weeks of life) mortality was relatively low, but mortality continued to be significant through August. Predators killed more calves in the SAP, primarily because a wolf den was located on the calving area. Despite the relatively high density of brown bears (*Ursus arctos*) and bald eagles (*Haliaeetus leucocephalus*), these predators killed fewer calves than expected. Golden eagles (*Aquila chrysaetos*) were uncommon on the Alaska Peninsula. At least two calves died from disease (probably pneumonia) in the range of the NAP but none died or were suspected to have died from disease in the range of the SAP. Heavy scavenging by bald eagles made it more difficult to determine cause of death of calves in both the NAP and SAP.

Status: Accepted for publication

Body weight of female calves and natality rate of adults as indicators of summer and winter limitation in two Alaskan caribou herds

PATRICK VALKENBURG, ROBERT W TOBEY, BRUCE W DALE, BRADLEY D SCOTTON, AND JAY M VER HOEF

Abstract: We studied body weight in female calves and natality rate of adult females in two adjacent Interior Alaskan caribou (*Rangifer tarandus granti*) herds during 1991–2000. Weight of newborn calves was similar in both herds, but Delta calves gained significantly more weight over summer than Nelchina calves. In contrast, Nelchina calves consistently maintained their weight during winter while Delta calves lost weight. Metatarsus length was similar in both herds in 4-month-old and 10-month-old calves, and it increased over winter in both herds. Natality rates of females ≥ 3 years old were consistently higher in the Delta Herd than in the Nelchina Herd, primarily because natality in 3- to 5-year-old Nelchina females was low. We concluded that summer nutrition significantly limits potential population growth and body weight in the Nelchina Herd, and managers are more likely to maximize harvest by maintaining herd size at or below 30,000, rather than by allowing the herd to grow larger. In contrast, the Delta Herd appears to be more strongly limited by winter range and predation than by summer range, and managers are more likely to maximize harvest by maintaining the herd near its present size (i.e., 3500) while reducing predation, especially in summer.

Status: In review.

Population dynamics of caribou herds in southwestern Alaska

PATRICK VALKENBURG, RICHARD A SELLERS, RONALD C SQUIBB, JAMES D WOOLINGTON, ANDREW R ADERMAN, AND BRUCE W DALE

Abstract: The five naturally occurring and one transplanted caribou herd in southwestern Alaska comprise about 20% of Alaska's caribou population. All five of the naturally occurring herds have fluctuated considerably in size. Two of the herds (Unimak and Southern Peninsula) are recovering from population declines, one (Northern Peninsula) appears to be nearing the end of a protracted decline, and another (Mulchatna) appears to now be declining after 20 years of rapid growth. The remaining naturally-occurring herd (Kilbuck) has virtually disappeared. Three of the herds in southwestern Alaska provide clear evidence that nutritional limitation affects body size and population growth in caribou. During declines in the Southern Alaska Peninsula Herd during the early 1980s and the Northern Alaska Peninsula Herd during 1995–2000 body size of calves and natality were low and mortality was high. Disease has also been prevalent during the decline of the Northern Alaska Peninsula Herd and recently in the Mulchatna Herd as well. Caribou transplanted from the Northern Alaska Peninsula Herd to ungrazed range on the Nushagak Peninsula increased in body size and quickly reached maximal productivity. Although predation is an important limiting factor of caribou on the Alaska Peninsula, patterns of predation differ from those in Interior Alaska, and predation does not seem to be sufficient to prevent population growth. Lichen biomass is low on the Alaska Peninsula, most likely because of sustained grazing by caribou. Volcanic ash falls may occasionally affect caribou but mortality has not been documented.

Status: In review.

Stumbling towards enlightenment: understanding caribou dynamics

PATRICK VALKENBURG

Abstract: I review what biologists now think we know about caribou dynamics (*Rangifer tarandus*) and how we came by this knowledge, in the hope that there are some lessons that will help us learn more efficiently in the future. Prior to the late 1940s, most knowledge about

caribou was obtained from anecdotal accounts of explorers, miners, government officials and from the traditional knowledge of Native people. From the late 1940s to the early 1960s, there was a great leap forward due to the use of modern aircraft for wildlife surveys, the establishment of the wildlife management program at the University of Alaska, wolf (*Canis lupus*) control, and the increased availability of funding for wildlife research in Canada and Alaska. During the 1960s, particularly in Alaska, the accumulation of knowledge slowed because of the change in administration from federal to state management, a shift in management and research priorities from caribou to moose (*Alces alces*), decreased funding and personnel for wildlife management, and because caribou were abundant throughout the state. Caribou were still viewed as a rather “unmanageable” species because of misunderstandings about population identity, population limitation and regulation, and caribou movements. Major declines in populations during the early 1970s, the development of reliable radio collars, and much greater availability of affordable helicopters led to a renaissance in caribou research during the late 1970s. During the mid-to-late 1980s, new information accrued more slowly while most herds were again increasing. Widespread declines of caribou in the early 1990s in conjunction with ongoing long-term research on population dynamics, weather, and predation, provided a large amount of new information. Knowledge about caribou dynamics, like the advancement of science in general, has not come in a gradual way. There have been periods of stagnation when caribou populations were high, interspersed with periods of confusion and then rapidly expanded research as herds declined. Despite greatly expanded knowledge, managers still have a limited ability to control caribou numbers, and the primary function of managers will continue to be providing for caribou hunting, while ensuring that hunting does not cause herds to decline to undesirably low levels. An increasingly important function for managers is providing accurate information to the public about caribou dynamics and the rationale for hunting regulations. Caribou biologists and managers should not be defensive or embarrassed about being wrong when new information casts doubt on old ideas, and creative new approaches to learning should be encouraged.

Status: Published in *Alces*.

VII. PROJECT COSTS FOR THIS SEGMENT PERIOD

FEDERAL AID SHARE \$39.2 + STATE SHARE \$13.0 = TOTAL \$52.2

VIII. PREPARED BY:

Patrick Valkenburg
Wildlife Biologist IV

Mark A Keech
Wildlife Biologist II

SUBMITTED BY:

David D James
Regional Supervisor

Laura A McCarthy
Publications Technician II

APPROVED BY:

Thomas W. Paul, Federal Aid Coordinator
Division of Wildlife Conservation

Wayne L Regelin, Director
Division of Wildlife Conservation

APPROVAL DATE: _____

